① $w = 2\sqrt{1-x^2}$

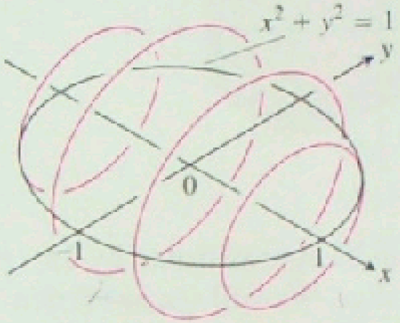
ⓐ $A = \pi r^2$ where $r = \frac{w}{2}$ so $A = \pi\left(\frac{2\sqrt{1-x^2}}{2}\right)^2 = \boxed{\pi(1-x^2}$

ⓑ $A = s^2$ $s = w$ so $A = (2\sqrt{1-x^2})^2 = \boxed{4(1-x^2)}$

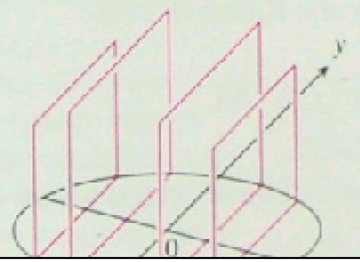
ⓒ $A = s^2$ $s = \frac{w}{\sqrt{2}}$ $A = \left(\frac{w}{\sqrt{2}}\right)^2 = \frac{4(1-x^2)}{2} = \boxed{2(1-x^2)}$

ⓓ $A = \frac{1}{2} \cdot \frac{\sqrt{3}}{2}x \cdot x$ $A = \frac{\sqrt{3}}{4}x^2$ but $x = w$ $\frac{\sqrt{3}}{4}\left(2(1-x^2)\right)^2 = \boxed{\sqrt{3}(1-x^2)}$

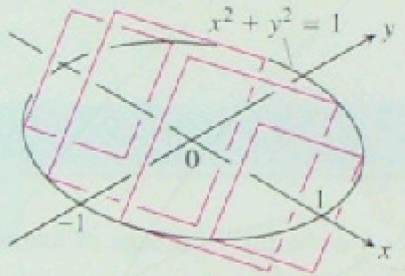
(a) The cross sections are circular disks with diameters in the xy-plane.



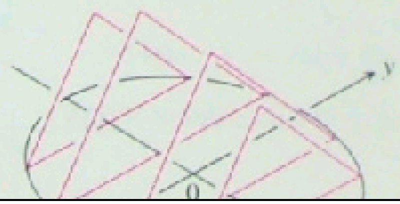
(b) The cross sections are squares with bases in the xy-plane.



(c) The cross sections are squares with diagonals in the xy-plane. (The length of a square's diagonal is $\sqrt{2}$ times the length of its sides.)



(d) The cross sections are equilateral triangles with bases in the xy-plane.



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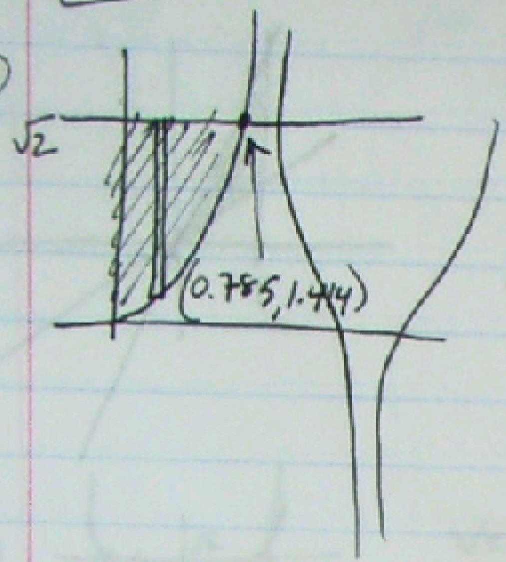
NINT (21)



$\sec x \tan x \to \frac{1}{\cos x} \cdot \frac{\sin x}{\cos x} = \frac{\sin x}{\cos^2 x}$

$$\cancel{V = \pi \int_0^{0.785} \left[(\sqrt{2})^2 - \sec^2 x \tan^2 x \right] dx}$$

$$\cancel{V = \pi \int_0^{0.785} (2)\,dx - \pi \int_0^{0.785} (\sec^2 x \tan^2 x)\,dx}$$

~~Use π·NINT [(2 − sec²x tan²x), x, 0, 0.785] ≈ 3.887~~

Wrong axis of rotation

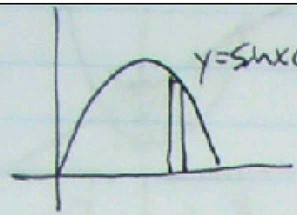
Intersect. $x = 0.785$ $\quad r = (\sqrt{2} - \sec x \tan x)$

so $V = \pi \int_0^{0.785} (\sqrt{2} - \sec x \tan x)^2 \, dx$ use π·NINT$((\sqrt{2} - \sec x \tan x)^2, x, 0, 0.785)$

π·NINT((√(2) − 1/(cos(x)·tan(x))², x,

$\boxed{= 2.301}$

(10)



disc $A = \pi y^2$ $\quad V = \int_0^{\frac{\pi}{2}} \pi y^2 \, dx$

$$V = \int_0^{\frac{\pi}{2}} \pi (\sin x \cos x)^2 \, dx \rightarrow \pi \int_0^{\frac{\pi}{2}} (\sin^2 x \cos^2 x) \, dx$$

but $\cos 2x = 2\cos^2 x - 1$ or $\cos 2x = 1 - 2\sin^2 x$

$$\cos^2 x = \frac{\cos 2x + 1}{2} \qquad \sin^2 x = \frac{\cos 2x - 1}{-2} \text{ or } \frac{1 - \cos 2x}{2}$$

so $\pi \int_0^{\frac{\pi}{2}} \left(\frac{1 - \cos 2x}{2} \cdot \frac{1 + \cos 2x}{2} \right) dx \rightarrow \frac{\pi}{4} \int_0^{\frac{\pi}{2}} (1 - \cos^2 2x) \, dx$

$= \frac{\pi}{4} \int_0^{\frac{\pi}{2}} \sin^2(2x) \, dx$ $\quad$ but $\sin^2 x = \frac{1 - \cos 2x}{2}$

so $\sin^2 2x = \frac{1 - \cos 4x}{2}$

$$\frac{\pi}{8} \int_0^{\frac{\pi}{2}} (1 - \cos 4x) \, dx \rightarrow \frac{\pi}{8} \left[x - \frac{1}{4} \sin 4x \right]_0^{\frac{\pi}{2}}$$

$$\frac{\pi}{8} \left[\frac{\pi}{2} - \frac{1}{4} \sin 4 \cdot \frac{\pi}{2} \right] \Rightarrow \frac{\pi}{8} \left[\frac{\pi}{2} - 0 \right] = \boxed{\frac{\pi^2}{16}}$$

$\boxed{7.3}$

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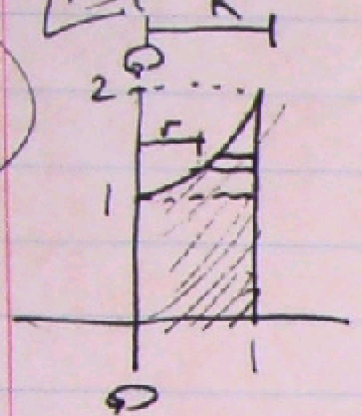

$x = \sqrt{y-1}$

$y = x^2 + 1, \quad y = 0, \quad x = 1$

$r = x^2 + 1 \qquad R = 1 \qquad V = \pi \int_{0}^{2} \left[1^2 - (x)^2 \right] dy \; + \;$ Cylinder $r=1 \; h=1$

$$V = \pi \int_{1}^{2} \left[(1) - (\sqrt{y-1})^2 \right] dy + \pi \;\rightarrow\; \pi \int_{1}^{2} (-y+2)\, dy + \pi$$

$$V = \pi \left[2y - \frac{y^2}{2} \right]_1^2 + \pi \;\rightarrow\; \pi \left[\left(2(2) - \frac{4}{2}\right) - \left(2 - \frac{1}{2}\right) \right] + \pi$$

$2 \quad -1.5 \quad \Rightarrow \frac{\pi}{2} + \pi = \boxed{\frac{3\pi}{2}}$

HW Do the dam Problem with the washer method

Read the shell method